This report is required by law (7 USC 2143). Failure to report according to the regulations can result in an order to cease and desist and to be subject to penalties as provided for in Section 2150.

See reverse side for additional information.

Interagency Report Control No
0180-DOA-AN

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE

ANNUAL REPORT OF RESEARCH FACILITY
(TYPE OR PRINT)

1. REGISTRATION NO. 63-R-0005

CUSTOMER NO. 858

FORM APPROVED
OMB NO. 0579-0036

2. HEADQUARTERS RESEARCH FACILITY *(Name and Address, as registered with USDA, include Zip Code)*

VANDERBILT UNIVERSITY
ASST VC FOR RESEARCH DIRECTOR ANIMAL CARE
(b)(2)High, (b)(7)f
NASHVILLE, TN 37232
(b)(2)High, (b)(7)f

3. REPORTING FACILITY (List all locations where animals were housed or used in actual research, testing, teaching, or experimentation, or held for these purposes. Attach additional sheets if necessary.)

FACILITY LOCATIONS*(sites)*

See Attached Listing
(b)(2)High, (b)(7)f

DEC 05

REPORT OF ANIMALS USED BY OR UNDER CONTROL OF RESEARCH FACILITY *(Attach additional sheets if necessary or use APHIS FORM 7023A)*

A. Animals Covered By The Animal Welfare Regulations	B. Number of animals being bred, conditioned, or held for use in teaching, testing, experiments, research, or surgery but not yet used for such purposes.	C. Number of animals upon which teaching, research, experiments, or tests were conducted involving no pain, distress, or use of pain-relieving drugs.	D. Number of animals upon which experiments, teaching, research, surgery, or tests were conducted involving accompanying pain or distress to the animals and for which appropriate anesthetic, analgesic, or tranquilizing drugs were used.	E. Number of animals upon which teaching, experiments, research, surgery or tests were conducted involving accompanying pain or distress to the animals and for which the use of appropriate anesthetic, analgesic, or tranquilizing drugs would have adversely affected the procedures, results, or interpretation of the teaching, research, experiments, surgery, or tests. *(An explanation of the procedures producing pain or distress in these animals and the reasons such drugs were not used must be attached to this report)*	F. TOTAL NO. OF ANIMALS **(Cols. C + D + E)**
4. Dogs			241		241
5. Cats			33		33
6. Guinea Pigs			68		68
7. Hamsters		215	11		226
8. Rabbits		55	237		292
9. Non-Human Primates	80		149		149
10. Sheep					0
11. Pigs			203	27	230
12. Other Farm Animals					
Goats			65		65
13. Other Animals					
Cotton Rat			102		102
Ferret			36		36
Gerbil			640		640

ASSURANCE STATEMENTS

1) Professionally acceptable standards governing the care, treatment, and use of animals, including appropriate use of anesthetic, analgesic, and tranquilizing drugs, prior to, during, and following actual research, teaching, testing, surgery, or experimentation were followed by this research facility.

2) Each principal investigator has considered alternatives to painful procedures.

3) This facility is adhering to the standards and regulations under the Act, and it has required that exceptions to the standards and regulations be specified and explained by the principal investigator and approved by the Institutional Animal Care and Use Committee (IACUC). **A summary of all the exceptions is attached to this annual report.** In addition to identifying the IACUC-approved exceptions, this summary includes a brief explanation of the exceptions, as well as the species and number of animals affected.

4) The attending veterinarian for this research facility has appropriate authority to ensure the provision of adequate veterinary care and to oversee the adequacy of other aspects of animal care and use.

CERTIFICATION BY HEADQUARTERS RESEARCH FACILITY OFFICIAL
(Chief Executive Officer or Legally Responsible Institutional official)

(b)(6), (b)(7)c

DATE SIGNED
11-30-06

1 - HEADQUARTERS

Attachment to APHIS FORM 7023

Summary of Exceptions to Regulations and Standards
Vanderbilt University 63-R-0005
Fiscal Year 2005-2006

1. The following protocols involve exceptions to the requirements for watering nonhuman primates. For each protocol listed, full access to water is regulated in a manner to ensure animals are adequately motivated to perform traditional operant conditioning paradigms. Access to water is regulated such that the first fluid intake of the day will occur during a training or experimental session. A well-trained animal will work to satiety during an experimental session and, in doing so, obtain its minimum daily water requirement. The amount of restriction varies across individuals and over time and is kept to the minimum necessary to maintain performance. Throughout the duration of an individual animal's participation in experimental protocols, fluid intake, weight, and a variety of other physiological and behavioral measures are recorded to assure the animal's continued health and well-being. Health and hydration are assessed daily by both research and veterinary personnel. A veterinarian performs an assessment and determines an appropriate course of action whenever concerns are noted. Each exception was approved by the Vanderbilt University (VU) Institutional Animal Care and Use Committee (IACUC), after their determination of scientific justification.

a. *M/02/303: Visual System Organization and Development*
Species Used: Macaques [Rhesus (*Macaca mulatta*), Cynomolgus (*M. fascicularis*), and Bonnet (*M. radiata*)]
Number Used: 2

b. *M/05/250: Cognitive Control of Thalamic Activity*
Species Used: Macaques [Cynomolgus (*M. fascicularis*) and Bonnet (*M. radiata*)]
Number Used: 2

c. *C/04/101: Deciphering Neural Codes for Perception Using Chronic, Multi-Site Microelectrode Recordings from Auditory and Multisensory Cortical Fields in Behaving Monkeys*
Species Used: Macaques [Rhesus (*M. mulatta*), Cynomolgus (*M. fascicularis*), and Bonnet (*M. radiata*)]
Number Used: 11

d. *C/05/080: a) Inter-areal Cooperativity During Perception of Visual Contours, b) Organization of Vibrotactile Information in SI Cortex*
Species Used: Macaques [Rhesus (*Macaca mulatta*), Cynomolgus (*M. fascicularis*), and Bonnet (*M. radiata*)]
Number Used: 14

e. *M/03/518: Neural Mechanisms of Visual Attention*
Species Used: Macaques [Rhesus (*M. mulatta*)]
Number Used: 6

f. *C/05/106: SaccadeTarget Selection – Frontal Cortex*
Species Used: Macaques [Rhesus (*M. mulatta*) and Bonnet (M. radiata)]
Number Used: 7

g. *C/06/029: Neural Control of Voluntary Movement*
Species Used: Macaques [Rhesus (*M. mulatta*) and Bonnet (M. radiata)]
Number Used: 6

2. The following protocol involves an exception to the exercise requirements for dogs. The objective of the research is to assess the capacity of an implantable stimulator (laryngeal "pacemaker") to reanimate paralyzed muscles of the larynx. The implantable stimulator could obviate the need for a tracheostomy (breathing hole in the throat) in some human patients that would otherwise require one. Following nerve transection to induce laryngeal paralysis, dogs are implanted with a laryngeal muscle stimulation device. To allow normal wound healing and stabilization of the implanted pacemaker, each animal is restricted from exercise for a maximum period of 10 days post-operatively. The exception was approved by the VU IACUC, after determination of scientific justification.

M/01/099: Rehabilitation of the Paralyzed Larynx
Species Used: Dogs (*Canis familiaris*)
Number Used: 1

3. The following protocols involve exceptions to the provision of food to dogs. These studies are done to investigate the hormonal and neural control of glucose metabolism, specifically gluconeogenesis and glycogenolysis, the two biologic processes by which glucose is made available. For each protocol listed, a subset of dogs is fasted for 42 hours prior to performing a metabolic study. At 42 hours of fast, glucose production by the liver is approximately 50% derived from *de novo* synthesis and 50% from glycogen breakdown. This is the minimal time in the progression of the switch from glycogenolysis to gluconeogenesis that the experimental techniques and methods allow the investigators to assess significant changes in gluconeogenic rates. The exceptions were approved by the VU IACUC, after determination of scientific justification.

M/03/082: Glycogenolysis and Gluconeogenesis: Role and Regulation
Species Used: Dogs (*Canis familiaris*)
Number Used: 26

M/04/279: Regulation of Net Hepatic Glucose Uptake In Vivo
Species Used: Dogs (*Canis familiaris*)
Number Used: 27

M/06/054: Studies to Evaluate the Efficacy of the Structurally Modified Insulin Preparation
Species Used: Dogs (*Canis familiaris*)
Number Used: 10

4. The following protocol involves an exception to the provision of food to dogs. This study is done to investigate how the body, especially the liver, responds to glucose oversupply and infection. Animals receive total nutritional support via a central vein for 4 days. During this time, dogs have free access to water, but access to food is limited. Intravenous nutrients (glucose, amino acids, lipid emulsion, electrolytes, and vitamins) are administered in amounts that meet daily the dogs' daily requirements and estimated energy expenditure. The exception was approved by the VU IACUC, after determination of scientific justification.

M/05/134: Nutrition Infection and Hepatic Carbohydrate Metabolism
Species Used: Dogs (*Canis familiaris*)
Number Used: 2

5. The following protocol involves an exception to the lighting requirements for cats. This study examines the role of visual experience on the development of multisensory processes in the midbrain. From birth, kittens are raised to adulthood in total darkness. Total darkness is required to eliminate all visual experience during development in

a reversible manner. Procedures such as enucleation or eyelid-suturing are inadequate because they are not reversible or allow a significant amount of light to penetrate the lids. A portion of the population is returned to full-spectrum lighting at six to twelve months of age. When in darkness, animals are cared for in accordance with all other standards and regulations. Infrared goggles are used by animal care, veterinary, and research personnel who enter the room daily to perform routine husbandry, health evaluations, enrichment, and research manipulations. All dark-reared animals have remained healthy. Results from this work are important for the improved treatment of children with visual disorders such as blindness, amblyopia, and strabismus. The exception was approved by the VU IACUC, after determination of scientific justification.

M/05/345: Experiential Influences on Cross-Modal Development
Species Used: Male and female domestic shorthair cats *(Felis domesticus)*
Number Used: 14

Attachment to APHIS FORM 7023

Explanation of Column E Procedures
Vanderbilt University 63-R-0005
Fiscal Year 2005-2006

The following protocols involve experiments reported in Column E. Experiments were approved by the Vanderbilt University (VU) Institutional Animal Care and Use Committee (IACUC), after their determination of scientific justification.

1. *M04-139:Hsp90/Client Protein Interactions in the Newborn Lung*
   Number of animals used in this study: *14 (number exposed to hypoxic atmosphere)*
   Species (common name) of animals used in the study: *Piglet*
   Explain the procedure producing pain and/or distress:

   This experiment examines the effects of low levels of oxygen (hypoxia) on tiny blood vessels from the lungs of newborn pigs. Piglets are placed in a plastic chamber and a hypoxic atmosphere is provided by delivering 10% O_2 at atmospheric pressure to simulate the environment of newborns born and living at an altitude of 15,000 feet. Control piglets are housed in a similar chamber but with a room air environment. Rapid gas flow and the use of soda lime CO_2 absorbent is used to keep the CO_2 level at approximately 3-5 mm Hg. The temperature and humidity of the chamber are monitored and recorded at least twice daily. In this experiment, piglets must remain in the chamber under the control or hypoxic environment for 12 to 14 days. Both the control and hypoxic chamber are opened at least 2 times a day to clean the chamber and replenish food. Although animals are not expected to experience significant discomfort, piglets are monitored for difficult breathing and other signs of respiratory distress, and euthanized if such signs are observed.

   Provide scientific justification why pain and/or distress could not be relieved. State methods used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see next response.):

   (b)(4)

   [redacted]. *Any potential discomfort was felt to be scientifically justified since maintaining the piglets in an hypoxic environment is the only known method for replicating the condition seen in human infants. To date, no signs of distress have been observed and no animals have been euthanized.*

   What, if any, federal regulations require this procedure? Cite the agency, the Code of Federal Regulations (CFR) title number and the specific section number (e.g. APHIS, 9 CFR 113.102):
   Agency: *Not applicable* CFR: *Not applicable*

2. *M06/030:* [redacted] (b)(4)

Number of animals used in this study: *4 (number exposed to hypoxic atmosphere)*

Species (common name) of animals used in the study: *Piglet*

Explain the procedure producing pain and/or distress:

This experiment examines the effects of low levels of oxygen (hypoxia) on tiny blood vessels from the lungs of newborn pigs. Piglets are placed in a plastic chamber and a hypoxic atmosphere is provided by delivering 10% O_2 at atmospheric pressure to simulate the environment of newborns born and living at an altitude of 15,000 feet. Control piglets are housed in a similar chamber but with a room air environment. Rapid gas flow and the use of soda lime CO_2 absorbent is used to keep the CO_2 level at approximately 3-5 mm Hg. The temperature and humidity of the chamber is monitored and recorded at least twice daily. In this experiment, piglets must remain in the chamber under the control or hypoxic environment for 10 days. Both the control and hypoxic chambers are opened at least 2 times a day to clean the chamber and replenish food. Although animals are not expected to experience significant discomfort, piglets are monitored for difficult breathing and other signs of respiratory distress, and euthanized if such signs are observed.

Provide scientific justification why pain and/or distress could not be relieved. State methods used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see next response.):

[redacted] (b)(4)

Any potential discomfort was felt to be scientifically justified since maintaining the piglets in an hypoxic environment is the only known method for replicating the condition seen in human infants. To date, no signs of distress have been observed and no animals have been euthanized.

What, if any, federal regulations require this procedure? Cite the agency, the Code of Federal Regulations (CFR) title number and the specific section number (e.g. APHIS, 9 CFR 113.102):

Agency: *Not applicable*

CFR: *Not applicable*

3. *M06/182:* (b)(4) *(replacement for M05/153 which was active from 6/1/05 until 6/06/06)*

Number of animals used in this study: *9 (number exposed to hypoxic atmosphere; 2 under M06/182 and 7 under M05/153)*

Species (common name) of animals used in the study: *Piglet*

Explain the procedure producing pain and/or distress:

This experiment examines the effects of low levels of oxygen (hypoxia) on tiny blood vessels from the lungs of newborn pigs. Piglets are placed in a plastic chamber and a hypoxic atmosphere is provided by delivering 10% O_2 at atmospheric pressure to simulate the environment of newborns born and living at an altitude of 15,000 feet. Control piglets are housed in a similar chamber but with a room air environment. Rapid gas flow and the use of soda lime CO_2 absorbent is used to keep the CO_2 level at approximately 3-5 mm Hg. The temperature and humidity of the chamber is monitored and recorded at least twice a day. In this experiment, piglets remain in the chamber under the control or hypoxic environment for either 3 days or 10 days. Both the control and hypoxic chambers are opened at least 2 times a day to clean the chamber and replenish food. Although animals are not expected to experience significant discomfort, piglets are monitored for difficult breathing and other signs of respiratory distress, and euthanized if such signs are observed.

Provide scientific justification why pain and/or distress could not be relieved. State methods used to determine that pain and/or distress relief would interfere with test results. (For Federally mandated testing, see next response.):

(b)(4)

[redacted]. *Any potential discomfort was felt to be scientifically justified since maintaining the piglets in an hypoxic environment is the only known method for replicating the condition seen in human infants. To date, no signs of distress have been observed and no animals have been euthanized.*

What, if any, federal regulations require this procedure? Cite the agency, the Code of Federal Regulations (CFR) title number and the specific section number (e.g. APHIS, 9 CFR 113.102):

Agency: *Not applicable* CFR: *Not applicable*